5.4L 4R70W Install
In a 1995 Thunderbird/Cougar

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This article shows how to convert a truck 5.4L 4R70W for use in a 1995 Thunderbird.
This should be identical for all 94-97 4R70W equipped Thunderbirds/Cougars.

Tools needed:
Snap ring pliers
Torque wrench (in-lbs is preferred)
Metric sockets and wrenches
CLEAN container (for draining the transmission fluid)
Pliers
Small hammer
Brake cleaner
Optional: (for Main Control Modifications)
Drill bits (for optional section): #48, #46, 1/8", #20, #15

Parts needed:
5.4L Transmission - XL3Z-7000-LARM
1999 Main Control - XW7Z-7A100-CA
MLPS Switch - F5AZ-7A247-AA
MLPS Lever - F4SZ-7A256-A
MLPS Stud - E9SZ-7B415-A
Gasket - F7AZ-7C155-AA
Gasket - XW7Z-7D100-AA

Optional:
Mark VIII Torque Converter - F8LZ-7902-BARM
Mark VIII Flexplate - F3LY-6375-A
96-97 Radiator - F4SZ-8005-HCP

Notes:
It used to be a common practice to replace the radiator after a transmission failure. Now there are magnetic filters available that solve the radiator debris problem much easier and cheaper. However, the 96-97 radiators have an upgraded transmission cooler from the 1994-95 style, and it will fit all 94-97 MN12s. I still strongly recommend flushing the radiator before installing the magnetic filter and transmission.
The installation shown here was a fresh Ford remanufactured 5.4L transmission which was then adapted to the MN12 application, ordered directly via Dan Newman. This particular transmission was chosen because some of the core pieces were much stronger than the stock internals. The truck Main Control should not be used in an MN12. The 1999+ Mustang Main Control is preferred, but the one from your old transmission will also work. For more reference, please read the Ford Overdrive Transmissions 101 article.

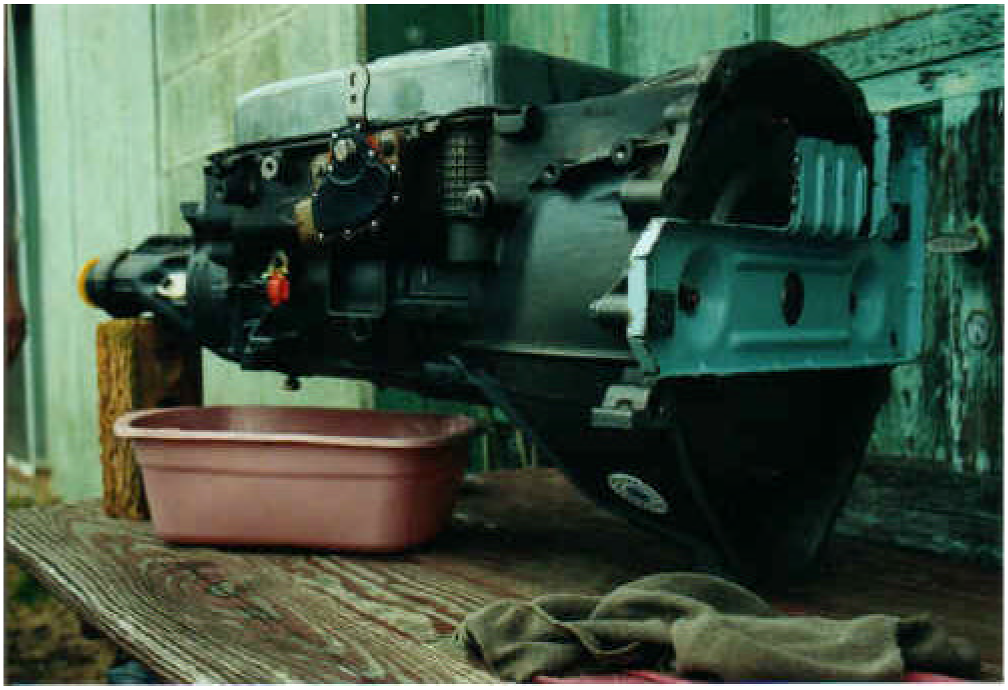
Step 1: Before you can make any internal changes, you must drain the fluid out into a clean container. A 3 gallon container should be enough for all of the transmisson fluid. First drain the torque converter. Pull the rubber grommet out of the bottom of the bellhousing, and use an 11mm socket to remove the plug on the torque converter. It will take about half an hour for it to fully drain. Replace and tighten the drain plug to 22 ft-lbs. of torque. Replace the grommet.

Step 2 (Optional): If you are upgrading to the Mark VIII Torque Converter, it is probably easiest to swap the converter now. Remove the plate from the front of the transmission, and then remove the old TC. It is recommended to put 1 quart of Mercon V in the new TC before installation. The new TC will go on without much trouble, though you may have to rotate it slightly for it to align and fully seat itself. Replace the plate to hold the new TC in place.

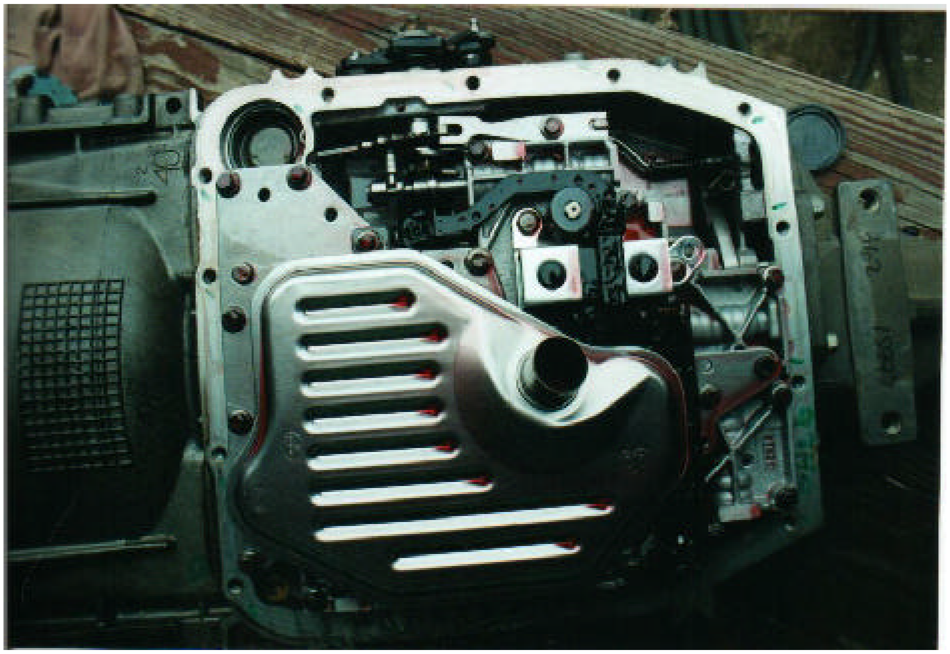
Step 3: The torque converter will now be empty, but the pan will still be filled to capacity. You will need to drain the pan through the dipstick tube hole. This step is much easier with a second set of hands. One person should use a funnel to catch the fluid into a container, while another tilts the transmission slowly to drain the fluid to a low level. You do not need to drain all of the fluid out, but you do need the level to be low enough that the pan will not overflow when its bolts are removed.

Step 4: Remove the drain pan. If possible, take the pan off before you turn the transmission upside down. This will allow you to clean the small amount of friction material that will be in the pan (it will be present due to the factory testing). It will also keep the amount of fluid that drains out through the vent hole to a minimum later.

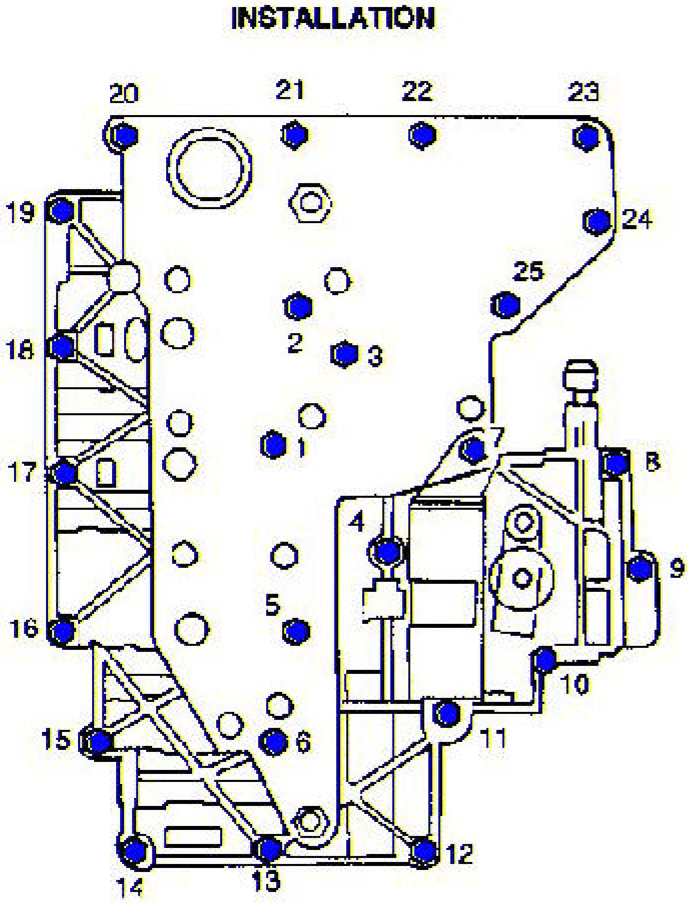
Step 5: The transmission is now ready to be rotated upside down for the internal work. You will need to place a small catch pan under the vent in the top, and support the tail shaft with something sturdy to have a level work area, as in the picture.
The transmission will not rotate itself easily due to the flat surface at the top of the bellhousing.



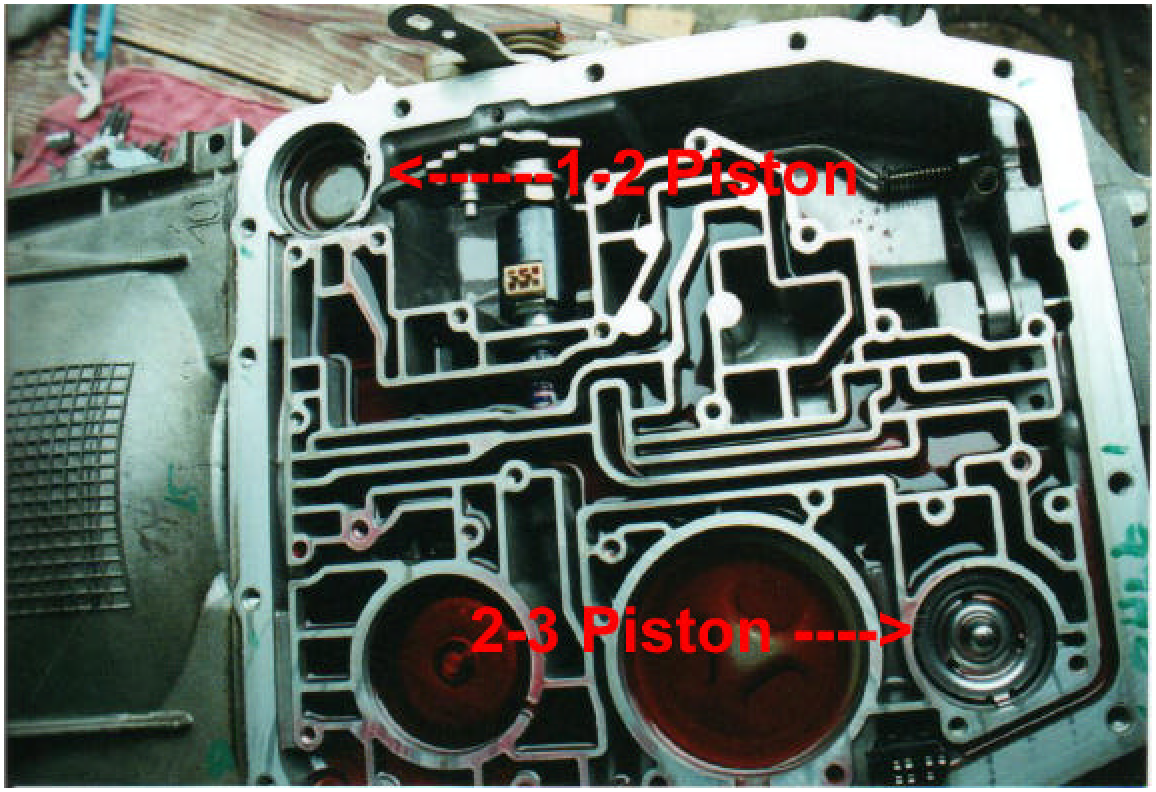
Step 6: Remove the transmission pan, the filter, and the one piece electrical connector. The connector has small tabs keeping it connected, take care not to break them off. It will look like this inside:



Step 7: Remove the valve body. There are 25 bolts, as shown in the diagram below. Don't forget to remove the EPC bracket and detent lever spring. The spring is held on by bolt #9 and the bracket by bolt #25. Note that bolts 1-3, 5-7, and 20-25 are longer than the rest.



Step 8 (Optional): Since the valve body is now removed, now is a good time to remove the 2-3 spring and lower 1-2 spring if desired. Take care when removing the 1-2 accumulator piston cover, as it can some times eject with force.



Step 8A: (Optional) The main control modifications described in the OD 101 article for a mild 1998 4R70W with a 1999+ Main Control are as follows:
Hole #1: .160"
Hole #2: .081"
Hole #3: .180"
Hole #4: .081"
Hole #5: .081"
Hole #6: .160"
Hole #7: .125"
Hole #8: No change necessary
Hole #9: .081"
Hole #10: .076"
Hole #11: .081"
To remove the separator plate, you must remove the 3 small circular plates shown in the picture by Step 9. Then the separator plate can be drilled to the above specifications. If you modify the Main Control, remove all drill shavings and make sure the plate surface is smooth before reinstalling.
Note: These sizes should ONLY be used on a 1998+ transmission with a 99+ main control. If you are adapting a different year transmission or older main control, you will need to refer to the OD 101 article for your drill sizes. Also, cars with more than 300hp should refer to the OD 101 article as well.

Step 9: The truck manual lever points in the wrong direction for an MN12 application, you will need the MN12 lever and accessories:

MLPS Switch - F5AZ-7A247-AA
MLPS Lever - F4SZ-7A256-A
MLPS Stud - E9SZ-7B415-A

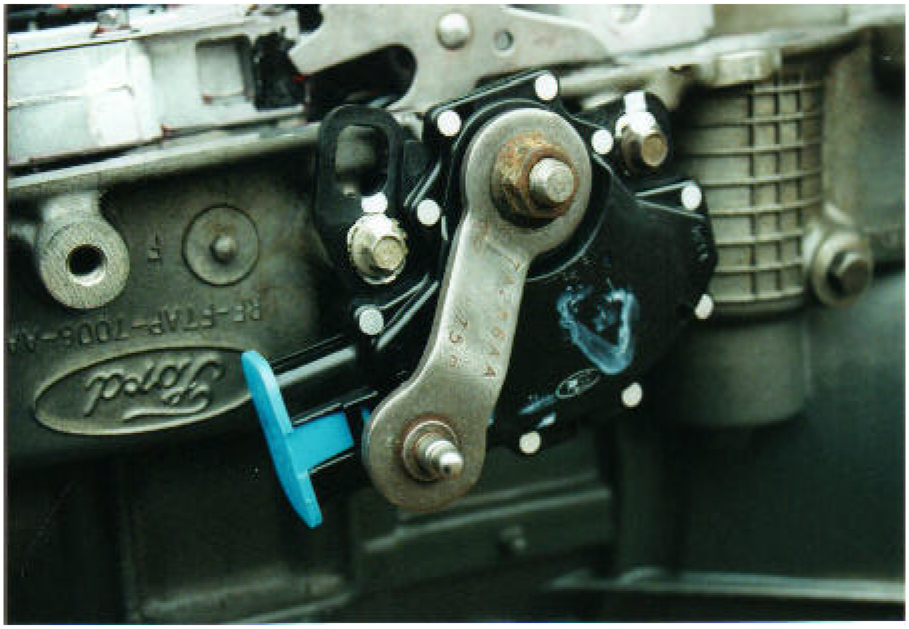
Notes: The MLPS may not need to be replaced on newer vehicles (1995+), but the number is there if needed. Some people have found aftermarket MLPS sensors which cost a fraction of the now-expensive factory unit and operate rather well. The lever and existing MLPS from the old MN12 transmission can be reused, but the part numbers are here for reference.

First remove the two MLPS bolts. The outside of the lever can be held with a 15mm wrench while the nut on the inside of the case(21mm) is removed. Should the 15mm nut come free, there are a small pair of 12mm flats that can be used to hold the lever in position. With the bolts free, the linkage will be loose. The only thing now holding the lever in place is a small pin that is inserted through the case into an indent on the lever. Use a small pair of pliers to remove the pin. I have found that wire cutters work well, but be careful not to cut the tip off the pin! Once the pin is removed, the lever will now pull free of the case.

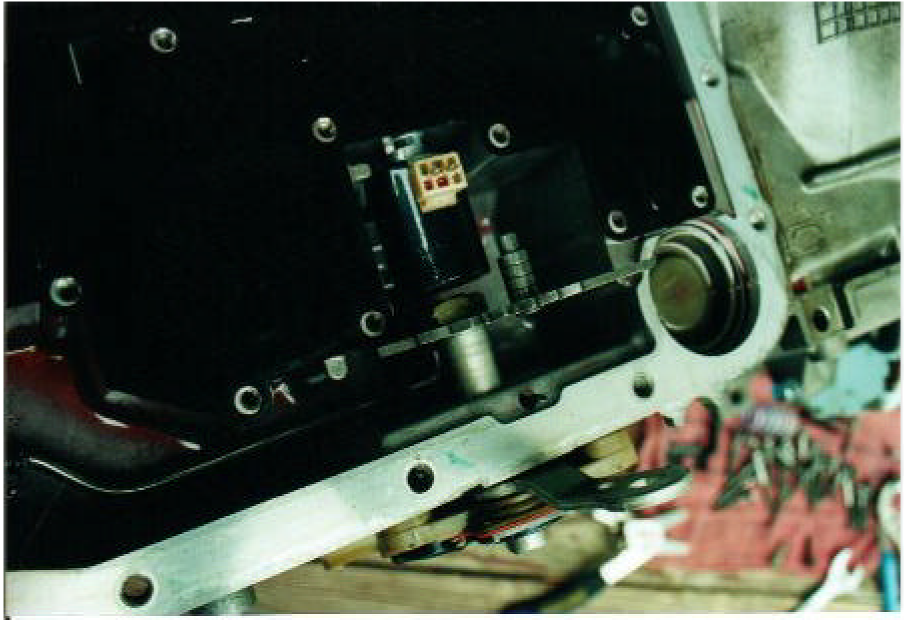
To install the new lever: slide the lever through the case, and use a small hammer to lightly tap the pin back into its proper place. Shown below is my dad performing that task.

Once the lever is secure in the case, the MN12 lever has a pair of 12mm flats to hold it from the outside while you tighten the nut on the inside. Hook up the linkage and tighten the nut. Then bolt on the MN12 MLPS sensor. It may need to be adjusted, but that must wait until the main control is reinstalled.

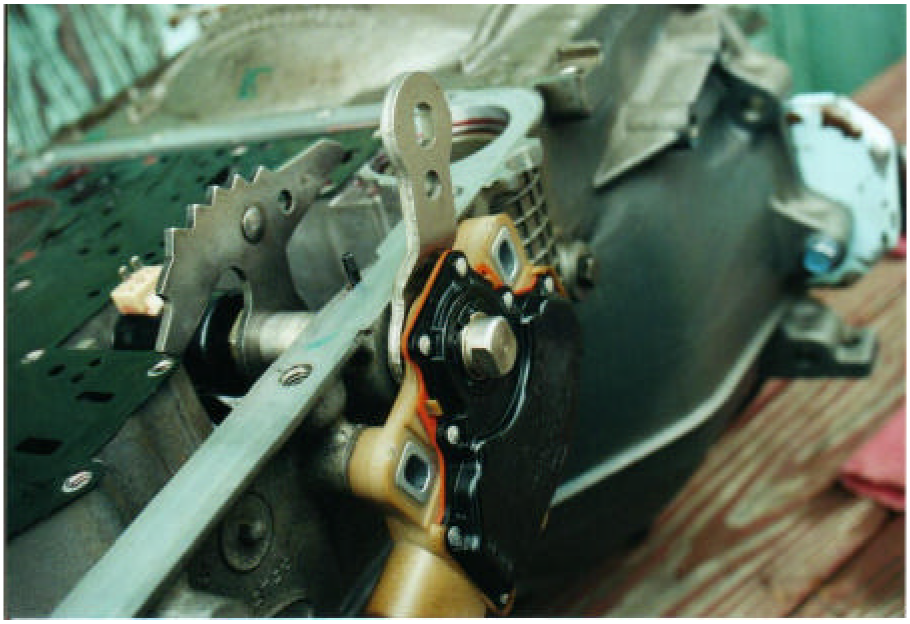
Old MLPS:



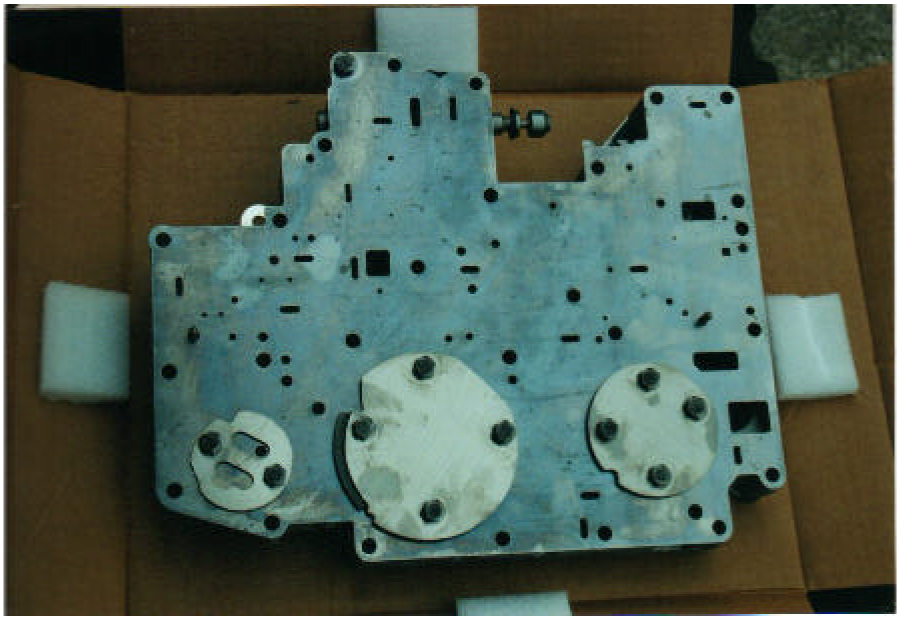
The lever: (note the nut inside and the pin just inside the case from the pan gasket area)



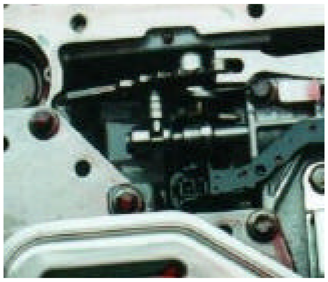
New MLPS installed:



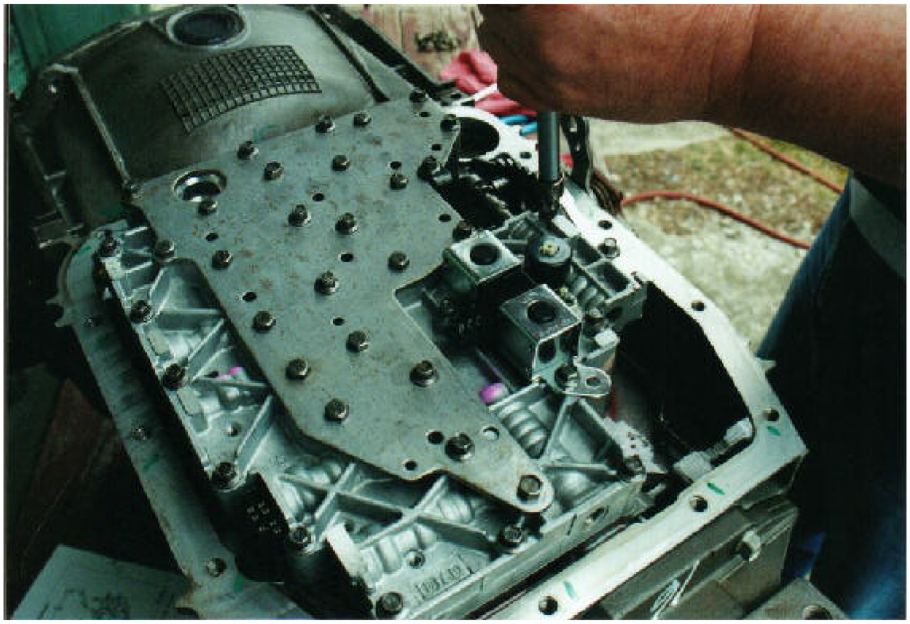
Step 9: Please take the time to thoroughly clean all of the parts that will go into the transmission. Dirt is one of a transmission's worst enemies. The finished main control is now ready to be installed.



To install, use the picture shown by step #7 to correctly tighten the main control bolts. All of these bolts should be torqued with an in-lbs. torque wrench to 90 in-lbs. I highly recommend using this sequence and going over the bolts at least 3 times - the gaskets will crush slightly and the bolts will appear to loosen. Most people may want to glance over this as being unimportant, but from experience I know that at least the 2nd and possibly 3rd time around there will still be bolts that will move. Failure to properly tighten main control bolts can cause crossleaks, which will cause erratic operation and can lead to transmission damage. The manual lever should appear like this once the main control is installed:

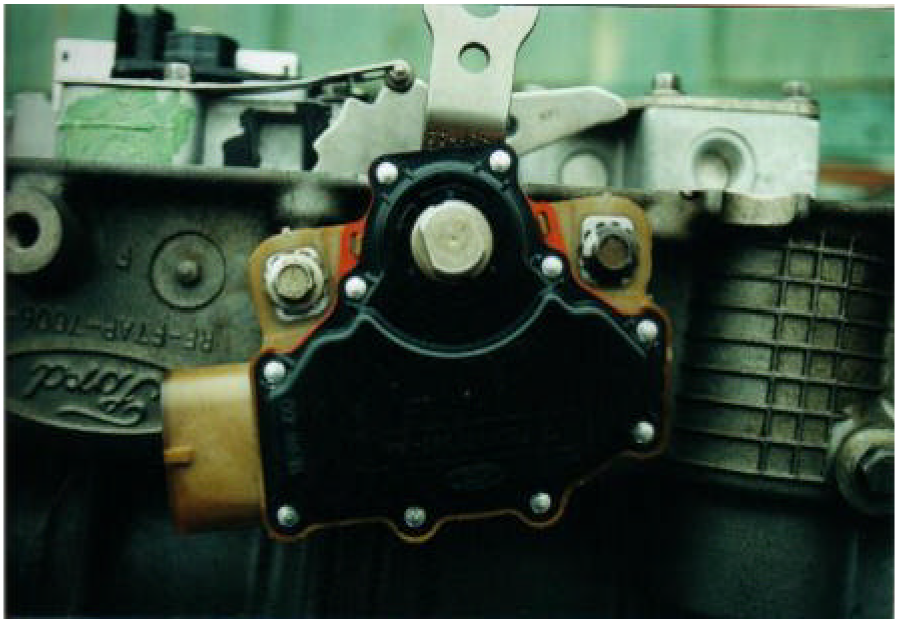


Tightening the main control:



Step 10: Now the wiring harness and filter can be reinstalled. The transmission should look pretty much the same as it did before the parts swapping.

Step 11: Once the internal changes are complete, put the lever into neutral. You can find which direction park is by watching the movement of the small rod that activates the parking pawl, then move two notches back to N. Then align the small marks on the MLPS together, which you will find looking at the MLPS from the side. Tighten the 2 bolts, and you're done.



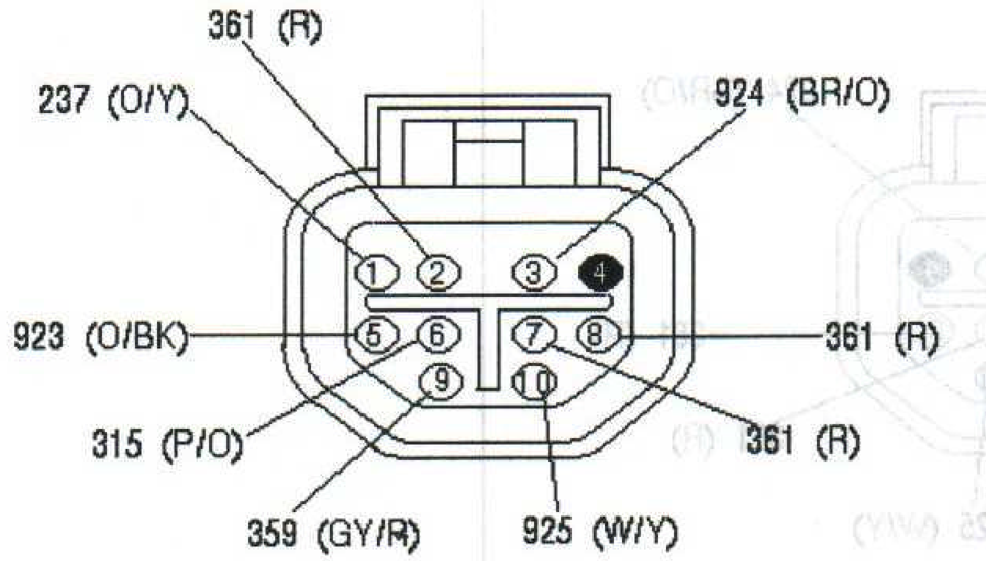
Step 12: Reinstall the pan and reusable gasket. Tighten all of the pan bolts to 120 in-lbs. Go over these at least twice.

Step 13: **Rewiring the harness for a 1998+ Transmission**

The harness connector (on the car side) holds the pins in place with small plastic tabs. Use a small screwdriver to move plastic tabs aside, and gently tug on the wires to remove them. Then reassemble them according to the diagram below. Two red leads will need to be taped and tied off, they will not be reused and should not be left to short out.

Old Wiring Diagram:

1994 -97 4R70W

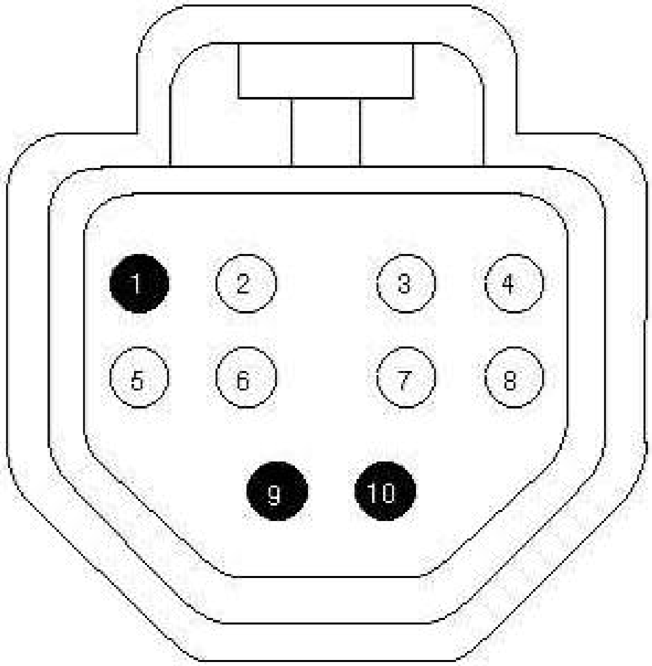


C1056 (BLACK)

4R70W TRANSMISSION

PIN NUMBER	CIRCUIT	CIRCUIT FUNCTION
1	237 (O/Y)	Shift Solenoid #1
2	361 (R)	Vehicle Power (Hot in START or RUN)
3	924 (BR/O)	Torque Converter Clutch (TCC) Solenoid
4	—	NOT USED
5	923 (O/BK)	Transmission Fluid Temperature (TFT) Input
6	315 (P/O)	Shift Solenoid #2
7	361 (R)	Vehicle Power (Hot in START or RUN)
8	361 (R)	Vehicle Power (Hot in START or RUN)
9	359 (GY/R)	Signal Return
10	925 (W/Y)	Electronic Pressure Control (EPC) Solenoid

New Wiring Diagram (1998+):



C132
4R70W TRANSMISSION

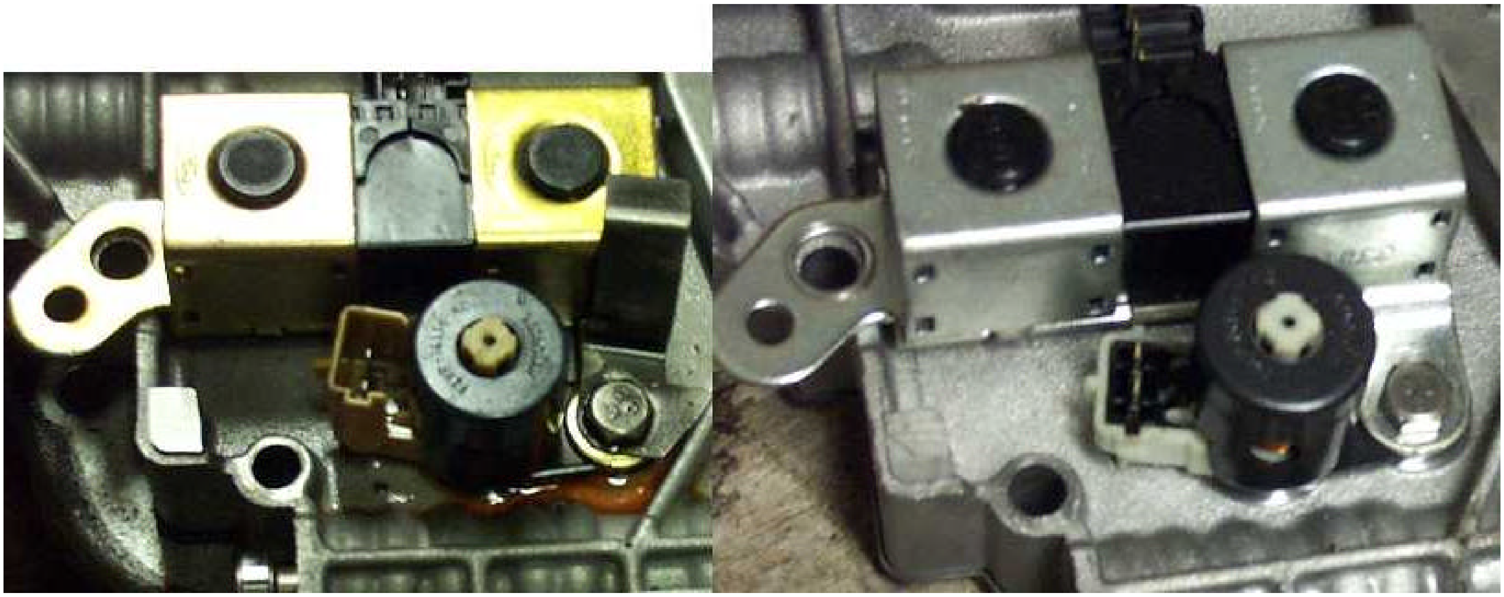
PIN	CIRCUIT	CIRCUIT FUNCTION
1	–	NOT USED
2	359 (GY/RD)	Signal Return
3	924 (BN/OG)	Torque Converter Clutch (TCC) Solenoid
4	361 (RD)	Vehicle Power
5	923 (OG/BK)	Transmission Fluid Temperature (TFT) Input
6	925 (WH/YE)	Electronic Pressure Control (EPC) Solenoid
7	237 (OG/YE)	Shift Solenoid A
8	315 (VT/OG)	Shift Solenoid B
9	–	NOT USED
10	–	NOT USED

Once the pins have been reinserted in the correct order, all of the outside wiring will now plug in without trouble.

The other option for converting another year transmission is to remove ALL the electronics from the old transmission and install them in the new one. This includes the EPC solenoid, the TCC solenoid, the shift solenoids, and the TFT (Trans Fluid Temp) sensor, and the wiring harness. If you choose to do this, swap the EPC solenoid out while you have the Main Control and manual lever out, it will be easier then.

Step 14: Torque Converter Control Solenoid (TCC)

The TCC solenoid needs to be whatever one is the correct one for your year car! This applies to all 4R70W vehicles, no matter what wiring system you have. If your car will be using the new style harness, a small section of the plastic of the TCC solenoid may have to be removed. Shown below on the left is the older style TCC for the wiring harness, on the right is the newer (98+) TCC solenoid. Do NOT use a newer solenoid than what came in your car. Older solenoid users should make sure their cut solenoids look like the ones to the right in order to plug into the newer harness.



Congrats! You’ve completed the mechanical and electrical changes necessary to convert this transmission to your MN12.